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Morris Liss
Pollock Vande Sande & Amernick
PO Box 19088
Washington, DC 20036-3425

EXAMINER	
MICHALSKI, JUSTIN I	
ART UNIT	PAPER NUMBER
2644	4

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/601,515	MOTOHASHI ET AL.	
	Examiner	**Art Unit**	
	Justin Michalski	2644	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 8/25/2000.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-35 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-35 is/are rejected.

7)☒ Claim(s) 1,22-24,28,and 32-35 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3.

4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: .

DETAILED ACTION

Drawings

1. Figures 1-4 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

2. The disclosure is objected to because of the following informalities: The word "base" is used incorrectly throughout the disclosure. The word --bass-- is suggested. Appropriate correction is required.

Claim Objections

3. Claims 1, 24, and 28 are objected to because of the following informalities: The word "base" is used incorrectly. The word --bass-- is suggested. Appropriate correction is required.

4. Claim 28 is objected to because of the following informalities: Line 4 of Claim 28, "a processing" is unclear; Line 5 of Claim 28, "a filter processing" is unclear; and Line 8 of Claim 28, "a distortion applying processing" is unclear. Appropriate correction is required.

5. Claims 32-34 are objected to because of the following informalities: "distortion applying processing is a processing" as stated in claims 32-34 is unclear. Appropriate correction is required.

6. Claims 22, 23, and 33-35 are objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim should refer to other claims in the alternative only. See MPEP § 608.01(n). Accordingly, claims 22, 23, and 33-35 have not been further treated on the merits.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

8. Claims 1, 6, 7, 8, 10, 11, 15, and 22-25 are rejected under 35 U.S.C. 102(e) as being anticipated by Aarts et al. (US Patent 6,111,960).

Regarding Claim 1, Aarts et al. discloses an acoustic effect apparatus (Fig. 1) comprising a filter means (filter 20) for picking out components corresponding to the double overtone regions of a bass musical instrument such as a bass or bass drum (Aarts et al. discloses the circuit comprises means for detecting levels at the selected frequency band, i.e. could be selected to receive double overtone region) (Column 1, lines 46-48) from an audio signal which is input from an input terminal (terminal 10); and distortion applying means (generator 22) receiving the components corresponding to the double overtone regions which are picked out by the filter means (filter 20) and applying a non-linear distortion (Aarts et al. discloses the generator may be replaced by another non-linear device to generate harmonics (i.e. distortion) (Column 5, lines 4-7)) to the components corresponding to the double overtone regions.

Regarding Claim 6, Aarts et al. further discloses a circuit (Fig. 1) for processing an audio signal comprising filter means (filter 20) that have a cut-off frequency on the bass side which is chosen in a range of 50~300Hz and has a cut-off frequency on the higher pitch side which is chosen to be in a range of 200~400Hz. (Aarts et al. discloses the selector means (filter 20) can be set to select a frequency band of an audio signal (Column 1, lines 6-11), which could include 50~300Hz on the bass side and 200~450Hz on the higher pitch side).

Regarding Claim 7, Aarts et al. discloses a circuit (Fig. 1) for processing an audio signal comprising filter means (filter 20) that have a cut-off frequency on the bass side

which is substantially equal to 200Hz and a cut-off frequency on the higher pitch side which is substantially equal to 400Hz (Aarts et al. discloses the selector means (filter 20) can be set to select a frequency band of an audio signal (Column 1, lines 6-11), which could include 200Hz on the bass side and 400Hz on the higher pitch side).

Regarding Claim 8, as stated above apropos of Claim 1, Aarts et al. anticipates all elements of that claim. In addition, Aarts et al. discloses a high pass filter having a cut-off frequency which is equal to the cut-off frequency on the bass side, and a low pass filter having a cut-off frequency which is equal to the cut-off frequency on the higher pitch side. (Aarts et al. discloses a low pass filter (filter 24) which can be set to a select frequency band (i.e. cut-off frequency on higher pitch side) (Column 1, lines 47-49) and a bandpass filter which could be configured to pass high frequency signals with a cut-off response equal to the bass side.)

Regarding Claim 10, Aarts et al. further discloses a device according to claim 1 in which the filter means comprises of a bandpass filter (Aarts et al. discloses that selecting means 20 is a low-pass filter but may also be a band-pass filter for selecting a part of the frequency spectrum of the audio signal) (Column 4, lines 60-62).

Regarding Claim 11, Aarts et al. further discloses a device according to claim 1 further comprising means for changing the cut-off frequency of the filter means (Aarts et al. discloses means for selecting a frequency band of the audio signal, i.e. the cut-off frequency of the filter can be changed) (Column 1, lines 8-13).

Regarding Claim 15, Aarts et al. discloses an acoustic effect apparatus (Fig. 1) comprising a narrow-bandpass filter (filter 20) (Aarts et al. discloses that filter 20 may

also be a band-pass filter (Column 4, lines 60-62) and selecting means for selecting a frequency band (Column 1, lines 12-13) which could include a narrow-bandpass filter) for picking out a double overtone component of a desired fundamental tone of a bass musical instrument from an audio signal which is input from an input terminal (terminal 10); and distortion applying means (generator 22) for receiving the double overtone component which is picked out by the narrow-bandpass filter for applying a non-linear distortion (Aarts et al. discloses the generator may be replaced by another non-linear device to generate harmonics (i.e. distortion) (Column 5, lines 4-7) to the double overtone component.

Regarding Claim 22, as stated above apropos of Claim 1, Aarts et al. anticipates all elements of that claim. In addition, Aarts et al. further discloses an acoustic effect apparatus (Fig. 1) comprising a summer (summer 26) for summing an output signal from the distortion applying means and the input audio signal from the input terminal for delivery to an output terminal (terminal 12).

Regarding Claim 23, Aarts et al. further discloses a acoustic effect apparatus (Fig. 1) comprising a low pass filter (reference 24, Aarts et al. discloses a bandpass filter for attenuating low and high frequency components (Column 4, lines 62-64) (i.e. bandpass filter could be adjusted to attenuate components equal or greater than 200Hz.) which is fed with an output signal from the distortion applying means (generator 22) and which provides a gentle attenuation of components substantially equal or greater than 200Hz before feeding the summer (summer 26).

Regarding Claim 24, Aarts et al. discloses a step of picking out a component to a double overtone region of a bass musical instrument such as a bass or a bass drum (Aarts et al. discloses a step for selecting a frequency band of an audio signal (Column 1, lines 21-27), frequency band could correspond to a double overtone region) from an input audio signal from an input terminal (reference 10) by means of filter means (filter 20); and a step of applying a non-linear distortion to the component corresponding to the double overtone region which is picked out by means of distortion applying means (Aarts et al. discloses a step for generating harmonics of a signal, i.e. distortion, selected by a filter (Column 1, lines 21-27).

Regarding Claim 25, Aarts et al. further discloses a step of summing the double overtone region component to which the non-linear distortion (Aarts et al. discloses generator 22 may be a non-linear device) (Column 5, lines 4-7) is applied and the input audio signal together for delivery (Column 1, lines 21-27).

9. Claims 18, 19, 28, 32-34 are rejected under 35 U.S.C. 102(e) as being anticipated by Jackson (US Patent 6,504,935).

Regarding Claim 18, Jackson discloses an acoustic effect apparatus (Fig. 4) comprising a highpass filter (reference 74, Jackson discloses bandsplitter can be replaced by high-pass filter) (Column 22, lines 3-11) for picking out a component corresponding a double or higher overtone of a bass musical instrument (Jackson discloses the use for distortion only to frequencies in upper mid-range and above, i.e. higher overtones of a bass musical instrument) (Column 22, lines 1-5) from an audio

signal which is input from an input terminal (input 42A); and distortion applying means (distortion function 68A) for receiving the component corresponding to the double or higher overtone which is picked out by the high pass filter (filter 74) and for applying a non-linear distortion to the component corresponding to the double or higher overtone; the distortion applying means having an input-output response which is a non-linear response having no point symmetry with respect to the center of an input amplitude (Jackson discloses distortion function Fig. 20b which is non-linear and asymmetric).

Regarding Claim 19, Jackson further discloses an acoustic effect apparatus (Fig. 4) in which the non-linear response is an input-output response which is S-shaped with respect to a rectilinear line representing a linear response (distortion function Fig. 20b) and which is defined by a curve having no point symmetry with respect to a reference point of an input and an output.

Regarding Claim 28, Jackson discloses a recorded medium having a program recorded thereon for execution by a computer of an acoustic effect apparatus (Jackson discloses method using digital techniques (i.e. computer) Column 3, lines 6-9), the program including processing for downloading audio data (Jackson discloses storage and recall of data) (Column 3, lines 19-22); filter processing for picking out a component data corresponding to the double overtone region of a bass musical instrument such as a bass or a bass drum from the downloaded audio data; and distortion applying processing which applies a non-linear distortion to the component data corresponding to the double overtone region which is picked out (Jackson discloses the use for distortion

only to frequencies in upper mid-range and above, i.e. overtones of a bass musical instrument) (Column 22, lines 1-5).

Regarding Claim 32, Jackson further discloses a distortion applying process (Figure 20b) which having an input-output response which is a non-linear response having no point symmetry with respect to the center of an input amplitude.

Regarding Claim 33, as stated above apropos of claims 28 and 30, Jackson anticipated all elements of those claims. Jackson further discloses distortion applying processes which a reference is made to a table having non-linear input-output responses (Jackson discloses distortion models (i.e. tables) can be stored for later recall) (Column 3, lines 19-22) recorded therein in terms of the component data corresponding to the double region which is picked out to deliver output data.

Regarding Claim 34, as stated above apropos of claims 28 and 30, Jackson anticipated all elements of those claims. Jackson further discloses a distortion process (Column 3, lines 19-22) which calculates a non-linear function (Figure 19d) using a variable defined by the component data corresponding to the double overtone region which is picked out to deliver output data (Jackson discloses storage of distortion models for later recall) (Column 3, lines 19-21).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aarts et al. as applied to claim 1 above in view of Iwamatsu (US Patent 5,040,220). Aarts discloses an acoustic effect apparatus with a filter means. Aarts et al. does not disclose the cut-off response on the bass side gentle enough to allow a fundamental tone component to be delivered through. Iwamatsu discloses a filter with a variable cut-off response (Column 11, lines 67-68). It is known in the art that cut-off responses with a lower slope allow more frequencies to pass through than cut-off responses with a higher, or sharper, slope. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a filter with a lower cut-off response in order to allow fundamental tone components to be delivered even thought subject to a level reduction in order to allow these fundamental tones to be heard.

12. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aarts et al. as modified as applied to claim 2 above, and in further view of Tanaka et al. (US Patent 5,850,460). Aarts et al. as modified discloses an acoustic effect apparatus. Aarts et al. does not disclose the cutoff response on the bass side of the filter means to be on the order of +12dB/OCT. Tanaka et al. discloses a speaker system with an attenuation curve which is approximately 12 dB/OCT at both low and high frequency ranges (Column 2, lines 26-28). Tanaka et al. teaches that this provides a bandpass characteristic suitable for a bass speaker (Column 2, lines 28-30). Therefore, it would

have been obvious to one of ordinary skill in the art at the time the invention was made to choose a cutoff response on the bass side of the filter means to be on the order of 12dB/OCT in order to provide a characteristic that is suitable for a bass frequency.

13. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aarts et al. as applied to claim 1 above in view of Gaulder (US Patent 4,135,590). Aarts et al. discloses an acoustic effect apparatus. Aarts et al. does not disclose a filter means that has a cut-off response on the higher pitch side which is steeper than the cut-off response on the bass side. Gaulder discloses a filter device (Fig. 4) where a filter has a steeper cut-off response on the higher pitch side than on the bass side. It is known in the art that selecting filters with sharper cut-off responses are more complex and will pass less signals outside of their passband than less complex filters with more gradual cut-off responses. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a filter where the cut-off response on the higher pitch side is steeper than the cut-off response on the bass side in order to select components up to a certain frequency but still allow some low components to pass below a less crucial lower cut-off frequency in order facilitate a less complex circuit and produce a cleaner signal.

14. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Aarts et al. and Gaulder as applied to claim 4 above, and further in view of Iwamatsu (US Patent 5,040,220). Aarts et al. as modified discloses an acoustic

effect apparatus but does not disclose the cut-off response being on the order of 24dB/OCT or steeper. Iwamatsu discloses a filter where the cut-off frequencies have gradients which can be set to either 12dB/OCT, 18dB/OCT, or 24 dB/OCT (Column 11, lines 64-67). It is known in the art that filters with a greater slope will attenuate more frequencies outside of its pass-band. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a steeper cut-off response on the order of 24dB/OCT as used in Iwamatsu in order to produce a cleaner signal free of unwanted frequencies.

15. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aarts et al. as applied to claim 8 above in view of Iwamatsu (US Patent 5,040,220). Aarts et al. discloses a high pass filter but does not disclose a small peak formed on a shoulder located adjacent to the cut-off frequency. Iwamatsu discloses a filter means where the Q value can be adjusted (Column 11, lines 63-64) thereby allowing the sharpness of resonance of each filter to be set (i.e. peak adjacent to cut off frequency) (Fig. 6, Column 11, lines 49-50). Iwamatsu shows in Fig. 6 that as Q increases the level of signal is passes. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have a high-pass filter where a peak existed in order to vary the sharpness of resonance of the filter (i.e. increase the gain at a certain frequency) in order to produce an output where a greater amount of certain wanted frequencies are passed to be processed at a greater amount than signals of other frequencies resulting in a more accurate signal.

16. Claims 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aarts et al. as applied to claim 1 above in view of Jackson (US Patent 6,504,935).

Regarding Claim 12, Aarts et al. discloses distortion means but does not disclose an input-output response with asymmetry. Jackson discloses an applying means for harmonic distortion (Fig. 20b) which has a non-linear response and no point symmetry with respect to the center of an input amplitude. It is known in the art that nonlinear transfer functions can be used to apply distortion to a signal. Jackson sites several examples of prior art that incorporate the use of non-linear processing and waveshaping for distortion (Columns 1 and 2). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a nonlinear and asymmetrical response to produce distortion.

Regarding Claim 13, Jackson further discloses the input-output response (Fig. 20b) which is S-shaped with respect to a rectilinear line which represents a linear input-output response and is defined by a curve which has no point symmetry with respect to a reference point of an input and output.

17. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Aarts et al. and Jackson as applied to claim 13 above, and in further view of Gummel (US Patent 3,683,417). Aarts et al. as modified discloses distortion applying means. Aarts et al. as modified does not disclose distortion applying means comprising of a transistor to which an output is fed to a collector and emitter delivering

an output while utilizing a non-linear response occurring adjacent to zero of the collector current and collector-emitter response of the transistor. It is known in the art that a transistor can operate in a non-linear region. Gummel discloses Figures 1 and 5 which illustrate the non-linear relationship between the collector-emitter voltage, collector current, and base current. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the nonlinear response occurring adjacent to the zero point of a transistor to apply distortion to a signal.

18. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aarts et al. as applied to claim 15 above in view of Tanaka et al. (US Patent 5,850,460). Aarts et al. does not disclose the cutoff response on the bass side of the filter means to be on the order of +12dB/OCT. Tanaka et al. discloses a speaker system with an attenuation curve which is approximately 12 dB/OCT at both low and high frequency ranges (Column 2, lines 26-28). Tanaka et al. teaches that this provides a bandpass characteristic suitable for a bass speaker (Column 2, lines 28-30). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to choose a cutoff response on the base side of the filter means to be on the order of 12dB/OCT in order to provide a characteristic that is suitable for a bass frequency.

19. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aarts et al. as applied to claim 15 above in view of Jackson (US Patent 6,504,935). Aarts et al. discloses a distortion applying means but does not disclose the input-output response

being asymmetric and S-shaped. Jackson discloses an input-output response (Fig. 20b) which is S-shaped with respect to a rectilinear line representing a linear response and which is defined by a curve having no point symmetry with respect to a reference point of an input and an output.

20. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jackson as applied to claim 18 above in view of Tanaka et al. (US Patent 5,850,460). Jackson discloses an acoustic effect apparatus but does not disclose the high pass filter with a cut-off frequency of about 200Hz and response substantially equal to 12dB/OCT. Tanaka et al. discloses a base speaker with an upper cut-off frequency of approx. 200Hz (Fig. 14). Tanaka further discloses the attenuation curve is approximately 12 dB/OCT providing a characteristic suitable for a bass speaker (i.e. bass frequencies). It is known in the art that overtones (i.e. harmonics) have frequencies greater than their fundamental frequency. In order to obtain the harmonics of bass sounds which are input to speaker response 14, frequencies of greater than 200 Hz would have to be obtained. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a filter which has a cut-off frequency of about 200Hz in order to pick out the overtones of bass frequencies and using a suitable cut-off response for bass frequencies substantially equal to 12dB/OCT in order to efficiently pick out the overtones of bass frequencies.

21. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jackson as applied to claim 18 above, and further in view of Iwamatsu (US Patent 5,040,220).

Jackson discloses an acoustic effect apparatus with a high pass filter. Jackson does not disclose the high pass filter having a small peak formed on a shoulder located adjacent to a cut-off frequency of its amplitude-frequency characteristic curve. Iwamatsu discloses a filter means where the Q value can be adjusted (Column 11, lines 63-64) thereby allowing the sharpness of resonance of each filter to be set (i.e. the peak adjacent to cut off frequency) (Fig. 6, Column 11, lines 49-50). Iwamatsu shows in Fig. 6 that as Q increases the level of signal is passes. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have a high-pass filter where a peak existed in order to vary the sharpness of resonance of the filter (i.e. increase the gain at a certain frequency) in order to produce an output where a greater amount of certain wanted frequencies are passed to be processed at a greater amount than signals of other frequencies resulting in a more accurate signal.

22. Claim 26 rejected under 35 U.S.C. 103(a) as being unpatentable over Aarts et al. as applied to claim 24 above in view of Iwamatsu (US Patent 5,040,220). Aarts et al. discloses an acoustic method which the filter means has a cut-off frequency on the bass side substantially equal to 200 Hz and a cut-off frequency on the higher pitch side which is substantially equal to 400 Hz (Aarts et al. discloses a band-pass filter for selecting a part of the frequency spectrum of an audio signal which could include cut-off frequencies of 200 and 400 Hz) (Column 4, lines 60-62). Aarts et al. does not disclose

the response as 12dB/OCT for the bass side and 24dB/OCT on the higher pitch side. Iwamatsu discloses a filter where the cut-off frequencies have gradients which can be set to either 12dB/OCT, 18dB/OCT, or 24 dB/OCT. It is known in the art that a filter response having a steeper slope as seen in Fig. 6 will pass fewer frequencies outside its bandwidth than a filter with a frequency response having a cut-off which is not as steep. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a cut-off response on the order of 12dB/OCT for the bass side and have a response or 24dB/OCT or greater on the high frequency side in order to obtain a more effective filter to pick the frequencies wanted.

23. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Aarts et al. and Iwamatsu as applied to claim 26 above, and further in view of Jackson (US Patent 6,504,935). Aarts et al. as modified discloses an acoustic effect method. Aarts et al. as modified does not disclose distortion means being non-linear and asymmetric. Jackson discloses distortion-applying means (Fig. 20b) that has an input-output response which is a non-linear and has no point symmetry with respect to the center of an input amplitude. It is known in the art that nonlinear transfer functions can be used to apply distortion to a signal. Jackson sites several examples of prior art that incorporate the use of non-linear processing and waveshaping for distortion (Columns 1 and 2). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a nonlinear and asymmetrical response to produce distortion.

24. Claims 29, 30, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jackson as applied to claim 28 above, and further in view of Aarts et al. (US Patent 6,111,960) and Iwammatsu (US Patent 5,040,220).

Regarding Claim 29, Jackson discloses a recording medium according to Claim 28. Jackson does not disclose the cut-off response of the filter means. Aarts et al. discloses a circuit (Fig. 1) for processing an audio signal comprising filter means that have a cut-off frequency on the bass side which is chosen in a range of 50~300Hz and has a cut-off frequency on the higher pitch side which is chosen to be in a range of 200~400Hz. (Aarts et al. discloses the selector means (filter 20) can be set to select a frequency band of an audio signal (Column 1, lines 6-11), which could include 50~300Hz on the bass side and 200~450Hz on the higher pitch side). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a selectable frequency band filter as disclosed by Aarts et al. in order to select frequencies within a desired range. Jackson as modified does not disclose the use of cut-off response of 24 dB for the high pitch side and 12 dB for the bass side. Iwamatsu discloses a filter where the cut-off frequencies have gradients which can be set to either 12dB/OCT, 18dB/OCT, or 24 dB/OCT. It is known in the art that a filter response having a steeper slope as seen in Fig. 6 will pass less frequencies outside it's desired bandwidth than a filter with a frequency response having a cut-off which is not as steep. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a cut-off response on the order of 12dB/OCT for the

bass side and have a response or 24dB/OCT or greater on the high frequency side in order to obtain a more effective filter to pick the frequencies wanted.

Regarding Claim 30, Aarts et al. further discloses a circuit for processing an audio signal comprising filter means (filter 20) that have a cut-off frequency on the bass side which is substantially equal to 200Hz and a cut-off frequency on the higher pitch side which is substantially equal to 400Hz (Aarts et al. discloses the selector means (filter 20) can be set to select a frequency band of an audio signal, which could include 200Hz on the bass side and 400Hz on the higher pitch side) (Column 1, lines 6-11).

Regarding Claim 35, Jackson discloses a device according to claims 28 and 32 as stated above. Jackson does not disclose a low pass filter which can be used to gradually reduce component data corresponding to the double overtone region to which the non-linear distortion is added. Aarts et al. discloses a bandpass filter (Fig. 1, reference 24) which can be configured as a low pass filter to gradually reduce the component data corresponding to the double overtone region to which the non-linear distortion is added by generator 22 as the component data goes toward the higher pitch. Aarts et al. teaches that the band-pass filter serves to eliminate any low and high frequencies (Column 4, lines 62-64). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a filter after the distortion means to manipulate the distorted signal as taught by Aarts et al.

25. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jackson as applied to claim 28 above in view of Hahne (US Patent 4,797,933). Jackson

discloses a device as stated in Claim 28. Jackson does not disclose a high pass filter with a cutoff on the bass side and a low pass filter with a cut-off response on the higher side. Hahne discloses a response (Figure 5) in which a high pass filter has a cut-off response on the bass side and a low pass filter with a cut-off response on the higher pitch side.

Conclusion

26. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Tanaka et al. (US Patent 4,909,116). Tanaka et al. discloses a signal processing device using a CPU and table memory.

Hahne (US Patent 4,797,933). Hahne discloses a response with a low-pass filter and high-pass filter having the same cut-off frequency.

Klayman (US Patent 6,285,767). Klayman discloses a low frequency audio enhancement system which spectrally shapes harmonics of low audio frequencies.

Oda (US Patent 5,668,885) Oda discloses low frequency audio conversion circuit by means of a low pass selection circuit, processing, and addition to the original signal.

27. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Justin Michalski whose telephone number is (703)305-5598. The examiner can normally be reached on 8 Hours, 5 day/week.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bill Isen can be reached on (703)305-4386. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)305-3900.

JIM

XU MEI
PRIMARY EXAMINER